

GOLF IRON

BACKGROUND OF THE INVENTION

5 This invention relates to golf clubs. More particularly, this invention relates to golf club irons. The invention is particularly useful for muscle back iron golf club heads.

 Iron golf club heads are generally available in three different styles: the blade, the muscle back, and the cavity back. Hybrids of the three different styles are also available. The blade type iron has a club head where the back is substantially flat. In contrast, the
10 muscle back iron positions extra mass toward the bottom half of the back of the club head. The cavity back positions mass around the entire back periphery of the club head.

 When struck, a golf ball is most strongly influenced by an area of concentrated mass closest to where the ball strikes the face. Muscle back irons concentrate mass towards the bottom half of the head and therefore help the golf ball get airborne. Muscle
15 back irons, however, are neutral in concentration of mass in a lateral direction, providing no corrective bias to a ball struck near the heel or the toe of the golf club head. A cavity back club shifts mass towards the toe and the heel. This shifting of mass increases the cavity back iron's sweet spot as compared to the blade and the muscle back design. Accordingly, a perimeter-weighted or cavity back iron provides more forgiveness to a
20 golfer that does not consistently strike the ball with the center of the club head.

 A larger sweet spot can also have its drawbacks. Blades and muscle back irons are designed in a neutral manner, to allow a consistent ball striker to work the ball. Draws and fades are more difficult to achieve using perimeter weighted clubs because it requires the golfer to work against the corrective features built into the cavity back club. Accordingly,
25 many lower handicap golfers prefer the blade type iron because they can consistently hit the smaller sweet spot, thus obviating the need for the cavity back iron's large sweet spot, and still work the ball when desired.

 Since blades and muscle back irons require more consistent ball striking capability to play well using them, many golfers feel a sense of prestige when carrying these clubs in
30 their golf bag. The higher handicap player, on the other hand, is still confined to using the cavity back iron to compensate for his deficient ball striking consistency. Accordingly, it

is desirable to provide a golf club head that has the look of a muscle back iron while delivering some of the features of a cavity back design.

SUMMARY OF THE INVENTION

5 According to a first embodiment of the invention a golf club head is provided. The golf club head includes a front surface, a rear surface, a sole, a top edge, a hosel, and a muscle back portion. The front surface defines a strike face. The rear surface is opposite the front surface. The muscle back portion is interposed between the front surface and the rear surface and defines a cavity disposed in the muscle back portion. A compressible
10 material having a specific gravity less than material displaced can at least partially fill the cavity.

 The rear surface can include a muscle back surface and a blade surface. The muscle back portion of the club head can be interposed between the muscle back surface and the front surface. The muscle back surface can include an upper ledge that transitions
15 between the muscle back surface and the blade surface. The upper ledge can have a similar contour to the top edge. The blade surface can be parallel to the front surface.

 According to another embodiment of the invention a set of golf clubs is provided. Each of the golf clubs in the set includes a shaft and a club head. Each club head includes a hosel for connecting the club head to the shaft, a striking surface, and a rear portion
20 opposite the striking surface. At least one of the lower lofted clubs and at least one of the higher lofted clubs in the set each includes a muscle back portion as an element of the rear portion and defining a cavity in the muscle back portion. The cavity of the at least one lower lofted club is larger in volume than the cavity of the at least one higher lofted club.

 According to yet another embodiment of the invention, a golf club is provided.
25 The golf club includes a shaft and a muscle back iron golf club head attached to the shaft. The muscle back head includes a substantially flat back having an extra mass portion positioned toward the bottom of the club head, wherein the extra mass portion defines a cavity therein. The cavity can be substantially entirely enclosed within the club head. The cavity can be filled with a high rebound elastomer. A substantial portion to the extra mass
30 can be positioned below the cavity.

BRIEF DESCRIPTION OF FIGURES

FIG. 1 is a rear perspective view of a golf club head according to the present invention.

5 FIG. 2 is a front elevation view of the golf club head of FIG. 1.

FIG. 3 is a top view of the golf club head of FIG. 1.

FIG. 4 is a side elevation view from the toe end of the golf club head of FIG. 1.

FIG. 5 is a cross section of FIG. 2 taken at line 5-5.

10 DETAILED DESCRIPTION OF THE INVENTION

The detailed embodiments of the present invention are disclosed herein. It should be understood, however, that the disclosed embodiments are merely exemplary of the invention, which may be embodied in various forms. Therefore, the details disclosed herein are not to be interpreted as limited, but merely as the basis for the claims and as a
15 basis for teaching one skilled in the art how to make and/or use the invention.

With reference to FIGS. 1 and 2, a golf club head 10 includes a front surface 12, a rear surface 14, a top edge 16, a sole 18, and a hosel 20. The golf club head includes a heel portion 22 near the hosel and a toe portion 24 towards an end opposite the heel portion. The front surface defines a striking face 26. Scores or grooves 28 are formed in
20 the striking face. The striking face can comprise a strike face insert (not shown) that is received in the club head. If the club head uses a strike face insert, the insert can be made of a different material than the remainder of the club. For instance, the strike face insert can be made of titanium and the remainder of the club head can be made of steel. The striking face can also be made of the same material as the rest of the club head.

25 With reference specifically to FIG. 1, the rear of the club head has no visible cavity like that of a cavity back iron. The rear surface 14 includes a muscle back surface 30 and a blade surface 32. Referring to FIG. 4, the muscle back surface defines a muscle back portion 34 of the golf club head, which will be described in more detail below. In the embodiment depicted, the muscle back surface is contoured and the blade surface is
30 substantially flat. The blade surface is substantially parallel to the front surface and provides a blade-like appearance to the upper portion of the club head. The muscle back

surface in this embodiment is contoured, however it can take a variety of shapes and forms, *i.e.* rectangular, triangular, as well as other shapes. Referring back to FIG. 1, an upper ledge 36 of the muscle back surface generally follows the contour of the top edge 16. The upper ledge provides a transition between the muscle back surface and the blade surface.

As more clearly visible in FIG. 3, the top edge 16 of the golf club head is relatively thin. This optional design gives the upper portion of the golf club head its blade-like design. With reference to FIG. 4, the sole 18 of the golf club is also optionally thin. The hosel 20 of the club head receives a shaft (not shown) to attach the club head to the shaft.

The muscle back portion 34 of the golf club is positioned towards the bottom rear portion of the club head. With reference to FIG. 5, in cross-section, the greatest distance between the muscle back surface 30 and the front surface 26, as measured perpendicular to the front surface, can be greater than twice the distance between the blade surface 22 and the front surface 26. The muscle back portion can encompass more than half of the surface area of the rear surface. The muscle back portion shifts the mass of the club towards the bottom half of the head, thus aiding the ball to get airborne after contact.

The muscle back portion 34 defines a cavity 38. The cavity can run laterally from the heel to the toe of the club head, or some portion thereof. Moreover, the cavity can be of any shape and at any location from heel to toe. The cavity can be positioned vertically towards an upper portion of the muscle back portion, centrally located, or towards a lower portion. The cavity can have a width that is slightly less than the width of the club head, *i.e.* the distance between the front surface 12 and the rear surface 14. Similar to a cavity back iron, the cavity 38 is positioned behind the front surface 12 such that the distance between a front wall 40 of the cavity and the striking surface 26 is similar to a conventional cavity back iron. However, the use of a compressible cavity insert can support a thinner striking face 26 to achieve a higher coefficient of restitution yet provide structural integrity to a thin-walled strike face.

The volume of the cavity can be varied. The cavity provides lateral forgiveness to the club head by redistributing weight to the toe and the heel, and thus giving the muscle back iron some of the benefits of the cavity back iron. As noticeable in FIG. 5, a large portion of the muscle back portion can be positioned under the cavity so that mass is still

concentrated towards the bottom of the club head, thus aiding the ball to get airborne after contact.

Many golfers have difficulty hitting the longer irons. For example, the three and four iron, the clubs having a lower loft angle, are more difficult for higher handicap
5 golfers to hit consistently straight. To compensate for this, the volume of the cavity can change with the loft angle of the club head. For example, in a set of clubs the cavity for the three iron can be larger than the cavity for the six iron. The cavity can also be positioned more towards the toe of the club head in the lower lofted clubs than in the higher lofted clubs. This would provide more forgiveness to the clubs that are usually
10 more difficult for the higher handicap golfer to hit well. A larger cavity may necessitate a larger muscle back portion.

An insert 42 can fit inside of the cavity 38. The insert can include an elastomer having high-rebound characteristics. The high-rebound characteristics allow the face of the club deform and then bounce back, similar to a trampoline. The high-rebound
15 characteristic provides a greater coefficient of restitution (COR) value. Such a high rebound elastomer can include a polyurethane elastomer such as MONOTHANE available from Chemical Innovations Limited, Preston, England.

The cavity 38 need not be filled with an insert and can be left hollow. The cavity can also be filled with a liquid, foam, or any compressible material including a low-
20 density metal or alloy. Furthermore, the cavity need not be entirely filled with the insert.

The insert can also comprise a material, for example the elastomer, that provides a dampening effect. This can provide the golfer a better "feel" of the shot. Such elastomers that provide a dampening effect are well known in the art. The insert could also serve a dual function of providing both a dampening effect, as well as a high-rebound
25 characteristic.

The invention has been described with reference to the preferred embodiments. Obviously, modifications and alterations will occur to others upon a reading and understanding of this specification without departing from the spirit and scope of the invention described herein. The invention is intended to include all such modifications and
30 alterations insofar as they come within the scope of the appended claims or the equivalents thereof.